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(54) Device for the control of a plurality of burners of a domestic gas cooking appliance

(57) A gas household oven for food cooking is described, of the type comprising at least two burners (1,2), which may be supplied with gas through command means (3), in particular an upper burner (1) and a lower burner (2), said oven comprising a combustion control device for said two burners, having at least a gas flow interception device to said burners (4,5), a flame detecting probe for each burner (7,7'), a spark plug for each burner (6,6') and a control unit (8).

According to the invention, said two flame detecting probes (7,7') and said two ignition spark plugs (6,6') are connected to one control unit alone (8), said command means comprises a flow deviation device (3) for allowing the alternative supply of gas either to only one or the other of said two burners (1,2) and the interception device (4,5) is arranged upstream of said deviation device (3).

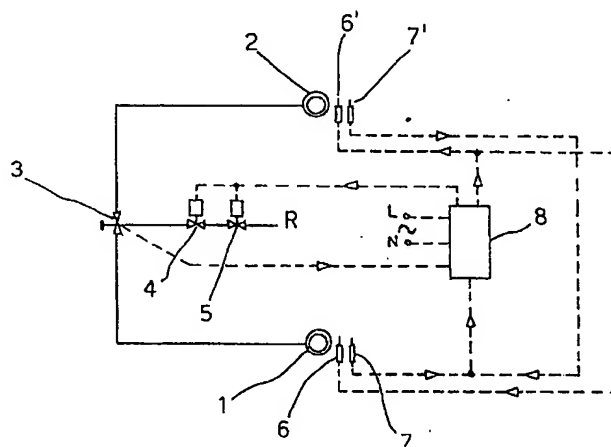


FIG. 1

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Description

The present invention refers to a gas-fired household food baking oven, comprising at least two burners which may be gas fired by control means, specifically an upper burner and a lower burner, said oven fitted with a combustion control device for said two burners, having at least a gas intercepting device to said burners, a flame detecting probe for each burner, a spark plug for each burner and a control unit.

The control method of the actual gas combustion in a burner of a cooking appliance through an electronic unit is known.

The operation of a cooking appliance fitted with this kind of units is as follows.

- The gas cock is opened manually and a switch controlled by the same cock knob activates the unit, which opens a safety solenoid valve (normally closed and connected in series with the cock) and a spark plug that will start the combustion
- A few instants later, provided that the combustion has started, the system receives a signal from a probe that detects ionization of the combustion gases and consequently the flame presence.

In this case the unit will keep the safety solenoid valve open.

If for any reasons combustion has not started and the flame has extinguished, the unit does not receive any signal from the probe and will remove voltage from the coil of the solenoid valve; the latter will thus go back to its closed position and stop the gas flow.

In some instances, due to safety reasons, two solenoid valves connected in series to each other may be fitted instead of one.

Thus, one of them closes the gas flow even if the other will remain open due to a fault.

Since the devices according to the known state of the art can possibly have several burners ignited simultaneously, such as for instance the upper and lower burners of an oven, each one of them needs to be equipped with its own unit; otherwise the activation signal coming from one flame detecting probe alone would be sufficient, in the instance of one unit alone, to allow a gas flow also to those burners where no ignition process has taken place, with a subsequent emission of non exhaust gas in the environment.

Such a system should necessarily provide a control unit for each burner, e.g. one associated with the oven burner and another associated with the grill burner.

Therefore, the management of several gas burners through several control unit according to the known art is expensive in terms of costs.

This invention is based on the consideration that, due to convenient and practical reasons in the use of the appliance, there is a spreading use and manufacture of cooking ovens which are able to operate with only one burner during the cooking process, i.e. to

optionally supply either the oven or the grill alone.

Such a limitation has been implemented to avoid reaching high temperatures inside the appliance, due to a simultaneous ignition of both the oven and grill burners, with the result that damages may ensue to the adjacent furniture of the cooking appliance.

Under these circumstances, it is the object of the present invention to provide for a household gas oven equipped with a control unit device for several burners, comprising all its known operating elements, including safety means, to obviate to the inconveniences associated with the known systems, through the use of simple and low-cost means.

Therefore, it is the object of the present invention to provide for a gas fired household oven for food cooking, comprising at least two burners, specifically an upper burner and a lower burner, which may be supplied with gas through command means, said oven comprising a combustion control device of said two burners, having at least a gas flow intercepting device to said burners, a flame detecting probe for each burner, a spark plug for each burner and a control unit, characterized in that said two probes and said two ignition spark plugs are connected to a single control unit, said command means comprises a flow deviating device capable of alternatively supply gas either to only one or the other of said two burners and that the flow intercepting device is located upstream of said deviating device.

The features and the advantages of the oven equipped with a device for the control of a plurality of burners of a gas-fired household cooking appliance according to the present invention will be apparent from the following description, with reference to the annexed drawing, which is provided by way of a non limiting example and which represents a diagram of the device for the control of a plurality of burners of a gas-fired household cooking appliance.

In said figure, reference number 1 indicates an oven lower, or bottom, burner, number 2 indicates an upper burner, or grill, of the same oven and number 3 indicates a manual deviation valve.

Said deviation valve 3 is integrated cock 3 having two alternative two-ways, i.e. when the gas flow is open to the lower oven burner, the gas flow to the grill will remain automatically closed, whereas the inverse situation occurs when the grill is supplied.

Said deviation valve 3 is not described in this context, as being known as such and normally used for low-cost cooking appliances without a control system.

Number 4 indicates a safety valve for intercepting the gas flow from the network, shown with letter R, whereas number 5 indicates an eventual second safety valve for intercepting the gas flow, which may be connected in series with the solenoid valve 4. Both the solenoid valves 4 and 5 are installed upstream of the deviation valve 3.

Said solenoid valves 4 and 5 are both electrically powered and controlled by an electronic control unit indicated with number 8.

Said unit 8 is based on a substantially known technique; however, with respect to the prior art, it is featured by a signal input for two detecting probes and a supply output for two spark plugs, respectively.

Numbers 6 and 6' indicate some ignition spark plugs feed by the unit 8, whereas numbers 7 and 7' indicate some ionization detecting probes for exhaust gases.

The device operates as follows:

- the user selects the burner to be ignited through the manual valve or cock 3. As described above, the configuration of the component 3 will not let the gas to flow to both the burners;
- a switch - not shown in the figure - controlled by the same knob used to control the cock 3 activates the unit 8 that, in its turn, will activate both the solenoid valves 4 and 5 for allowing the gas flow to the selected burner, which in the specific example is the oven lower burner 1; at the same time the unit will start the combustion through the ignition plug 6;
- if the combustion has started, the unit 8 receives a signal from the probe 7; following said signal the unit will keep the solenoid valves 4 and 5 open.

According to the present invention, it is not significant from a practical standpoint whether the unit 8 knows which of the two probes 7 and 7' has released the signal, since the latter surely comes from the burner that is selected by the user through the manual valve 3, and the other has no gas flow due to the specific configuration of the component 3;

- the unit 8 will keep solenoid valves 4 and 5 open till it receives the signal from the probe 7 that the combustion is occurring;
- the burner can then be turned out manually, by bringing the valve 3 to its closed position.

The same procedure is followed when the grill upper burner 2 is used instead of the oven lower burner.

In this instance, the cock 3 is rotated inversely with respect to the above situation, to let the gas flow to the upper burner 2 alone.

The cited switch controlled by the same knob of the cock 3 - not shown in the figure - activates the unit, which will activate the solenoid valves 4 and 5 to allow the gas flow to the selected burner; at the same time the unit activates the combustion through the ignition spark plug 6'.

If the combustion has started, the unit 8 receives a signal from the probe 7'; following such a signal the unit will keep solenoid valves 4 and 5 open.

According to the invention, and as already specified when the oven lower burner 1 is used, it has no practical significance whether the unit 8 knows which one of the two probes 7 and 7' has released the signal, since it surely comes from the burner that has been selected by the user through

the manual valve 3, and the other has no gas flow due to the specific configuration of the component 3.

The unit 8 will keep the solenoid valves 4 and 5 open till it receives the signal from the probe 7' that combustion is occurring.

- The burner can then be turned out manually, by bringing the valve 3 to its closed position.

The gas-fired household food baking oven equipped with a control device for a plurality of burners, according to the present invention, will be apparent from the above description and the annexed drawing.

As it can be seen from the above description, the gas fired household food baking oven equipped with a control device for a plurality of burners according to the present invention has the advantage of having only one control unit for several burners, resulting in a cost reduction and an unchanged safety, if compared to the known art.

Obviously, many changes are possible to the manufacturing features of the gas-fired domestic oven for food cooking equipped with the control device for a plurality of burners according to the invention described by way of example, without departing from the novelty spirit thereof and it is also clear that in the practical actuation of the invention the components and the sizes may differ from the ones described above and be replaced with technical equivalent elements.

As an example, the ignition and blow-out procedure may be easily automated, providing for a servo-controlled cock rotation by the control unit or replacing the cock with solenoid valves.

Moreover, the ignition or blow-out command may be started by a thermostatic control or a timer, or both of them in a cascade connection.

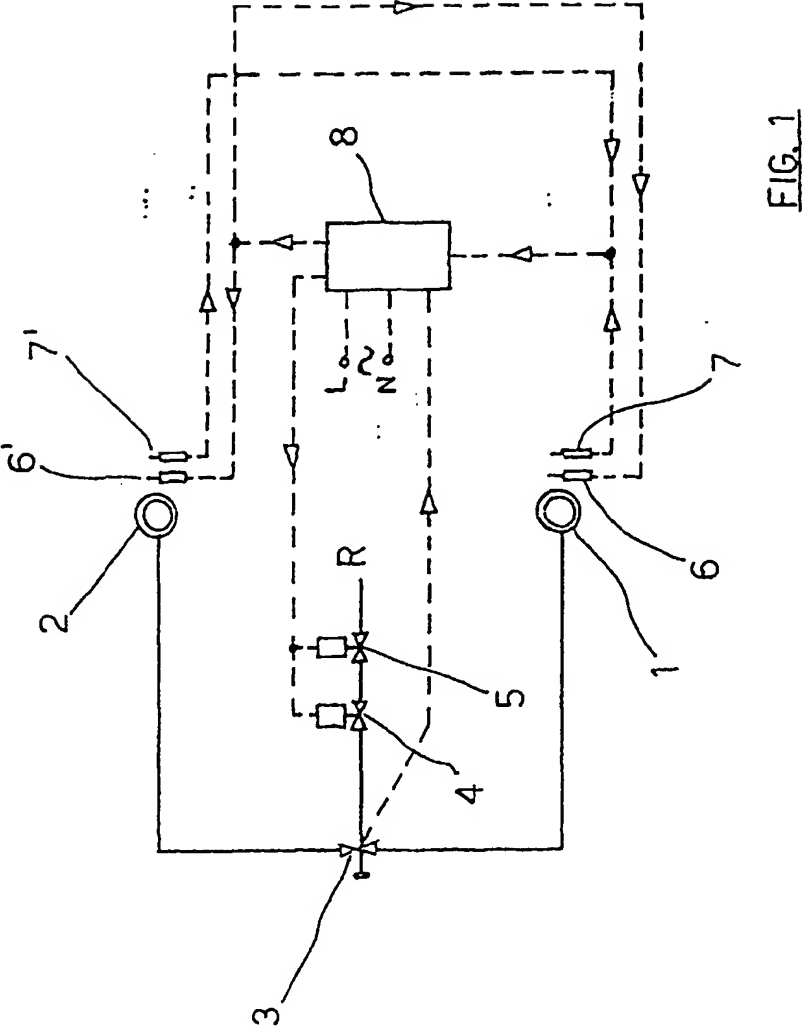
The unit can be programmed to repeat the ignition procedure one or more times, should the burner not ignite on first trial; if the operation has no satisfactory result, the system will stop the procedure and give an error signal after a predetermined number of repeats.

Claims

1. A gas household oven for food cooking, of the type comprising at least two burners (1,2), which may be supplied with gas through command means (3), in particular an upper burner (1) and a lower burner (2), said oven comprising a combustion control device for said two burners, having at least a gas flow interception device to said burners (4,5), a flame detecting probe for each burner (7,7'), a spark plug for each burner (6,6') and a control unit (8), characterized in that said two flame detecting probes (7,7') and said two ignition spark plugs (6,6') are connected to one control unit alone (8), and that said command means comprises a flow deviation device (3) for allowing the alternative supply of gas either to only one or the other of said two burners

(1,2).

2. A gas household oven for food cooking, according to claim 1, characterized in that said gas flow interception device (4,5) is arranged upstream of said gas flow deviation device (3). 5
3. A gas household oven for food cooking, according to claim 1, characterized in that said flow deviation device (3) comprises a cock with two ways optional to each other for supplying the gas to a first burner (1) or to a second burner (2). 10
4. A gas household oven for food cooking, according to claim 1, characterized in that said gas flow interception device (4,5) comprises at least a solenoid valve. 15
5. A gas household oven for food cooking, according to claim 1, characterized in that said flame detecting probes (7,7') are of the exhaust gas ionization type. 20
6. A gas household oven for food cooking, according to claim 1, characterized in that said control unit (8) for controlling a plurality of burners (1,2) is a unit of the electronic type. 25
7. A gas household oven for food cooking, according to claim 1, characterized in that said two spark plugs (6,6') for the ignition of said burners (1,2) are supplied by said unit alone (8). 30
8. A gas household oven for food cooking, according to claim 1, characterized in that said control unit (8) for the control of a plurality of burners (1,2) has only one input for the combustion signal coming from said probes (7,7'). 35
9. A gas household oven for food cooking, according to claim 1, characterized in that said control unit (8) for the control of a plurality of burners (1,2) has only one output for supplying said ignition spark plugs (6,6'). 40
10. A method for controlling the operation of two burners of a gas oven for food cooking, comprising detecting means (7,7') of the flame presence on each burner, characterized in that, following the capability to select through command means (3) only one of said two burners, and consequently allowing the gas supply to only one of said two burners, the correct operation of the oven is deduced even if only one signal is generated of the actual combustion from any of said detecting means (7,7'). 45 50 55





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 97 10 7904

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 3 476 315 A (BIGGLE) * the whole document * ---	1-4,7,9, 10	F23N1/00 F24C3/12
X	GB 2 200 739 A (BOSCH - SIEMENS HAUSGERÄTE) * the whole document * ---	1-4,8,10	
A		5	
X	GB 2 198 520 A (BOOSCH - SIEMENS HAUSGERÄTE) * the whole document * ---	1,10	
A	GB 1 293 037 A (LANDIS & GYR) * the whole document * ---	5	
A	US 5 161 963 A (BERLINCOURT) * abstract; figures * -----	5	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			F23N F24C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14 August 1997	Examiner KOOIJMAN, F
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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DERWENT-ACC-NO: 1997-552437

DERWENT-WEEK: 199935

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TITLE: Domestic gas cooker burner control device - uses electronic control unit to control burner operation in conjunction with deviation valve and two solenoid safety valves

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EP 807789 A1	November 19, 1997	E	005	F23N 001/00
~12~				
DE 29723760 U1	July 22, 1999	N/A	000	<u>~2~F24C 003/12</u>

DESIGNATED-STATES: DE FR GB IT

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EP 807789A1	N/A	1997EP-0107904	May 15, 1997
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DE 29723760U1	Application no.	1997EP-0107904	May 15, 1997

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ABSTRACTED-PUB-NO: EP 807789A

BASIC-ABSTRACT:

The domestic gas cooker includes at least two burners (1,2) which are supplied with gas through a deviation valve (3) comprising an integrated **cock** with two alternative flow ways. The deviation valve allows gas to be supplied to one of the burners in either position. Two solenoid safety valves (4,5), in series, intercept the gas flow from the network (R).

The safety valves are controlled from an electronic control unit (8) which also controls ignition spark plugs (6,6') for the respective burners. Each burner is provided with an ionisation detection probe (7,7') for the exhaust gases. The burner to be used is selected via the deviation valve which action activates the control unit.

ADVANTAGE - Improves the safety of operation by ensuring that only one burner can be in use and that it is operating correctly.

CHOSEN-DRAWING: Dwg.1/1

TITLE-TERMS: DOMESTIC GAS COOKER BURNER CONTROL DEVICE ELECTRONIC
CONTROL UNIT CONTROL BURNER OPERATE CONJUNCTION DEVIATE
VALVE TWO SOLENOID SAFETY VALVE

DERWENT-CLASS: Q73 Q74 X27

EPI-CODES: X27-C05; X27-G02;

SECONDARY-ACC-NO:

Non-CPI Secondary Accession Numbers: N1997-460307